3.8.2 General Science Paper 2 (237/2)

SECTION A: BIOLOGY (34 marks)

*Answer **all** the questions in this section in the spaces provided.*

1. State **five** adaptations of xerophyte plant leaves. (5 marks)

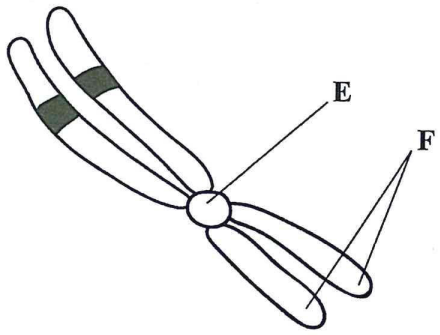
2. Name the organs where meiosis occurs in human beings. (2 marks)

3. State **two** functions of each of the following hormones in the menstrual cycle:

(i) progesterone (2 marks)

(ii) luteinising hormone. (2 marks)

4. The diagram below illustrates a chromosome.



(a) Name the part labelled

E ..... (1 mark)

F ..... (1 mark)

(b) State the total number of chromosomes in a human being. (1 mark)

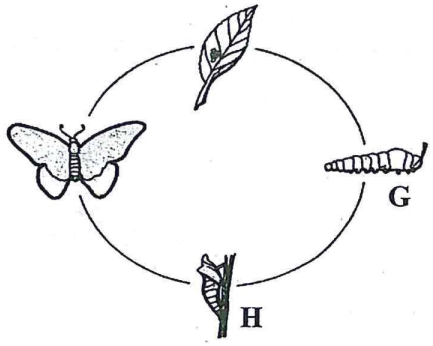
(c) What is the name given to an identical pair of chromosomes that controls a particular trait. (1 mark)

5. Give the meaning of each of the following terms as used in genetics:

(a) recessive gene; (1 mark)

(b) genotype. (1 mark)

6. The diagram below shows the life cycle of a butterfly.



(a) Name the stages labelled

G ..... (1 mark)

H ..... (1 mark)

(b) How is the life-cycle illustrated different from that of a grasshopper? (1 mark)

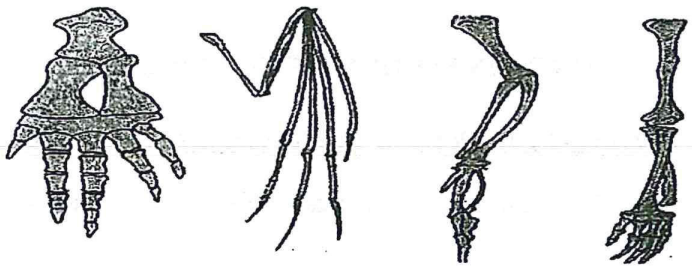
(c) Name **one** hormone involved in the illustrated life cycle. (1 mark)

7. State the meaning of the following terms:

(a) growth; (1 mark)

(b) development. (1 mark)

8. The diagrams below illustrate the structure of a forelimb in different animals.



Whale Bat Bird Human

(a) (i) State the name collectively given to the illustrated structures. (1 mark)

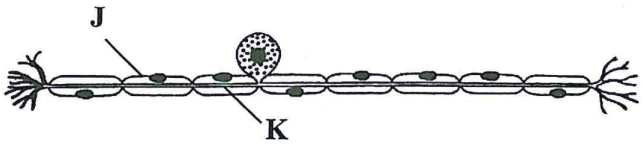
(ii) Give a reason for your answer in (a) (i) above. (1 mark)

(b) Name the type of:

(i) evolution evidence illustrated by the structures; (1 mark)

(ii) evolution illustrated by the structures. (1 mark)

9. The diagram below shows a nerve cell



(a) (i) Identify the nerve cell. (1 mark)

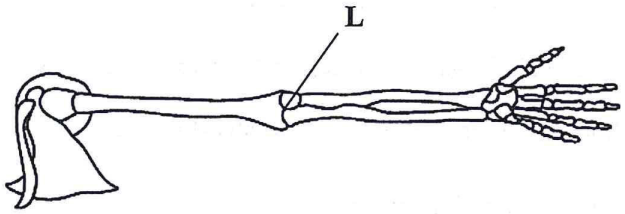
(ii) Give a reason for your answer in (a) (i) above. (1 mark)

(b) State the function of the part labelled.

J (1 mark)

K (1 mark)

10. The diagram below shows the arrangement of bones in a human being



(a) Name the type of skeleton illustrated by the bones. (1 mark)

(b) Name the type of joint found at the part labelled **L**. (1 mark)

(c) On the diagram, label the part of the skeleton with gliding joints. Label the part with the letter **M**. (1 mark)

SECTION B: CHEMISTRY (33 marks)

*Answer **all** the questions in this section in the spaces provided.*

11. Compound **J** reacts with one mole of chlorine gas to form **one** product **K**, whose molecular formula is $C_3H_6Cl_2$.

(a) Draw the structure of compound **J**. (1 mark)

(b) Name compound **K.** (1 mark)

(c) What type of reaction occurs between compound **J** and chlorine gas. (1 mark)

12. (a) Sulphur occurs in two crystalline forms;

(i) What name is given to the different forms of sulphur? (1 mark)

(ii) Name the **two** forms of sulphur. (1 mark)

(b) Name another element that occurs in two crystalline forms. (1 mark)

13. **Figure 1** shows curves representing the changes in mass when equal masses of powdered marble and marble chips were reacted with excess 2M hydrochloric acid. Study it and answer the questions that follow.

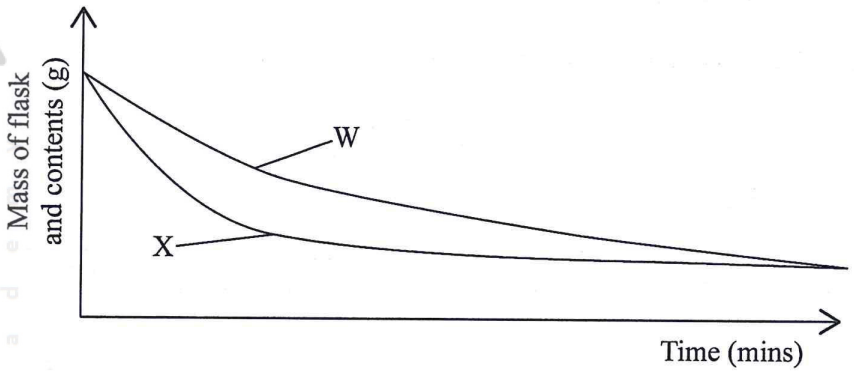


Figure 1

(a) Write an equation for the reaction between marble chips and hydrochloric acid. (1 mark)

(b) Identify the curve that represents the reaction with powdered marble chips. Explain. (2 marks)

(c) Other than the factor being investigated in this reaction, state another factor that affect the reaction rate. (1 mark)

14. Aluminium is extracted using electrolytic method.

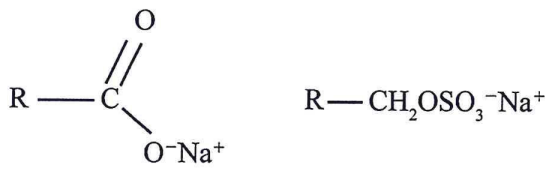
(a) Name **two** ores from which aluminium is extracted. (2 marks)

(b) During the electrolysis process, cryolite (Na_2AlF_6) is added to aluminium oxide. Give a reason. (1 mark)

(c) State **two** properties of duralumin, an alloy of aluminium that makes it preferred to aluminium in the construction of aircrafts. (2 marks)

15. The atomic mass of element **E** is 13. Given that 17.25 g of **E** reacted completely with 11.5 dm^3 of oxygen at 25 °C. Determine the relative atomic mass of **E**. (Molar gas volume = 24 dm^3) (3 marks)

16. Consider the following structures of **two** cleansing agents.



B **C**

(a) Identify the soapless cleansing agent. (1 mark)

(b) State the advantage of the cleansing agent **C** over **B**. (1 mark)

17. (a) State Charles' law. (1 mark)

(b) Explain why the pressure of a fixed mass of a gas increases when the volume of the gas is reduced at constant temperature. (2 marks)

18. Study **Figure 2** and use it to answer the questions that follow.

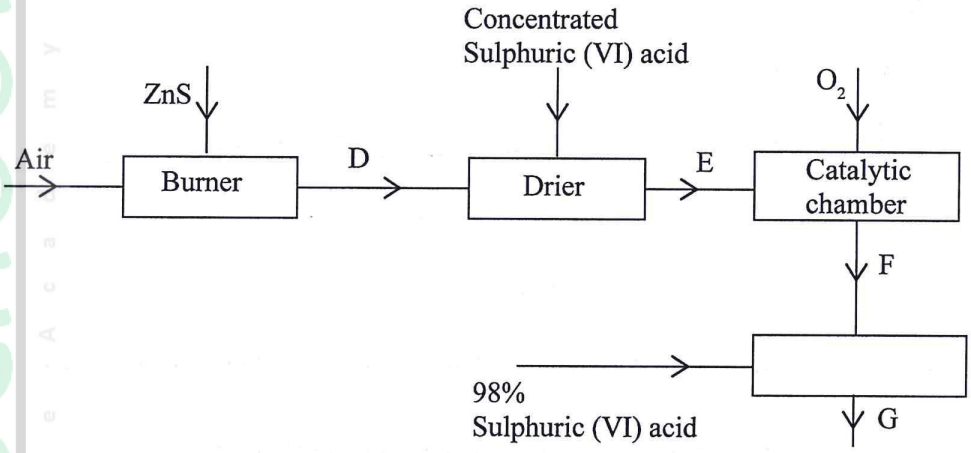


Figure 2

(a) Other than rare gases, name **two** gases which are from the burner to the drier. (1 mark)

(b) Name the catalyst used in the catalytic chamber. (1 mark)

(c) Write an equation for the reaction which occurs in the catalytic chamber. (1 mark)

(d) Write the formula of **G.** (1 mark)

19. (a) What is a standard solution? (1 mark)

(b) Calculate the mass of sodium hydroxide that can be used to prepare 250 cm^3 of 1 mol dm^{-3} sodium hydroxide solution. (Na = 23.0, O = 16.0, H = 1.0) (2 marks)

20. (a) What is meant by enthalpy of reaction? (1 mark)

(b) Draw an energy level diagram for dissolving ammonium nitrate in water in which the temperature of the resulting solution drops. (2 marks)

SECTION C: PHYSICS (33 marks)

*Answer **all** the questions in this section in the spaces provided.*

21. **Figure 3** shows an object in the shape of letter E placed in front of a plane mirror.

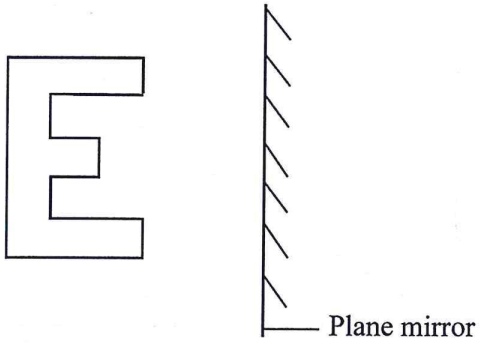


Figure 3

Draw a ray diagram to show the image of the object. (3 marks)

22. Two rods A and B were rubbed with a piece of cloth and brought close to a positively charged sphere. It was observed that rod A attracted the sphere while rod B repelled the sphere. State a reason for this observation. (1 mark)

23. (a) **Figure 4** shows a bar magnet.

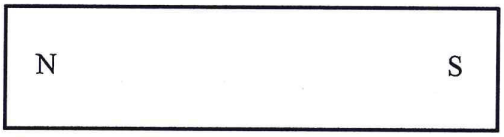


Figure 4

Draw the magnetic field lines around the magnet. (2 marks)

(b) State the reason why the power of attraction of a magnet is greatest at the poles. (1 mark)

24. State the reason why a sound wave is a longitudinal wave (1 mark)

25. (a) Define the potential difference between two points X and Y. (1 mark)

(b) **Figure 5** is a graph of potential difference against current obtained in an experiment to study Ohm's law.

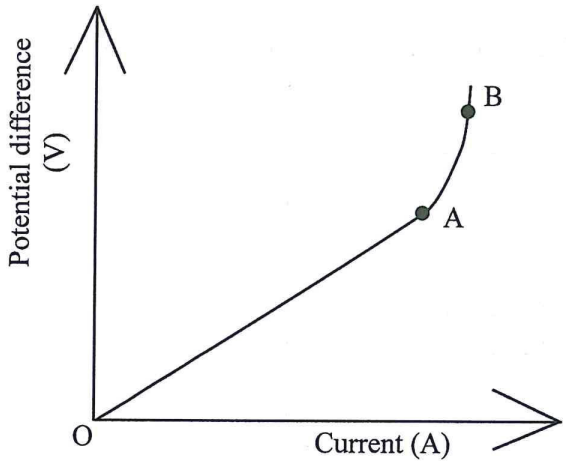


Figure 5

(i) Explain section OA of the graph (2 marks)

(ii) State the reason for the change in the shape of the graph in section AB. (1 mark)

26. State the factors that determine the quantity of heat produced by a coil carrying a constant current. (2 marks)

27. A student observed that when part of a ruler is immersed in water in a beaker, the ruler appears bent. Explain this observation. (2 marks)

28. **Figure 6** shows an object O of height 1 cm placed 4 cm in front of a converging lens of focal length 10 cm.

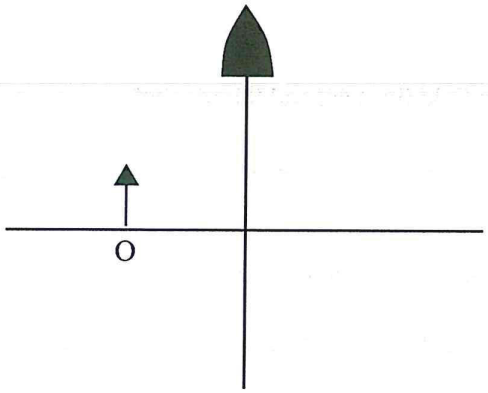


Figure 6

(a) On the figure draw a ray diagram to determine the position of the image. (3 marks)

(b) From the ray diagram in (a) determine the size of the image. (1 mark)

29. A domestic consumer uses five 100 W bulbs for four hours daily. Given that the bill is Ksh. 900 in a 30 day month, determine the cost per Kilowatt-Hour of electrical energy. (3 marks)

30. Explain how a cathode ray oscilloscope is used to measure voltage. (2 marks)

31. State **three** ways in which cooling the anode of an X-ray tube is achieved. (3 marks)

32. State with a reason which particles are deflected less when moving through a strong magnetic field. (2 marks)

33. **Figure 7** shows an incomplete circuit consisting of a p – n junction diode and a switch.

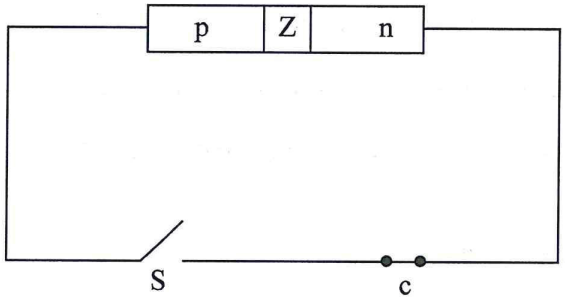


Figure 7

(a) State the name of the region labelled **Z**. (1 mark)

(b) Complete the diagram to show how a cell may be connected at C so that the junction is reverse biased when the switch S is closed. (1 mark)

(c) State what happens to the charges at Z when the switch in (b) is closed. (1 mark)